a step of judging an end point of an irradiation area from said secondary difference values calculated in said calculating step.

9.   (Amended)   An image processing method comprising:

a step of detecting an irradiation end, based on a density distribution in each area, for a plurality of areas in a desired direction in said image; and

a step of evaluating a result of said detection, based on said detected irradiation ends for said plurality of areas;

wherein said detection step comprises calculating a secondary difference value from a plurality of primary difference values, wherein each primary difference value corresponds to a difference between density values each of which represents a respective area in each of said plurality of areas.

12.   (Amended)   An image processing method for judging whether an object area in an image includes an irradiation area, said method comprising:

a secondary difference value acquisition step of acquiring secondary difference values from a plurality of primary difference values, wherein each primary difference value corresponds to a difference between density values each of which represents a respective area in one-dimensional image data through said object area;

an irradiation end extraction step of extracting a coordinate of an end point of said irradiation area from the secondary difference values acquired in said secondary difference value acquisition step;

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a comparison step of comparing the coordinate extracted in said irradiation end extraction

step with a coordinate of an end point of the irradiation area included in said image, said latter

coordinate being obtained preliminarily; and

a judgment step of judging whether said object area includes the irradiation area, based

on a result of the comparison in said comparison step.

14.   Amended)   A method according to Claim 12, further comprising an

accumulated image data production step of producing projection of image data in said image,

thereby obtaining said one-dimensional image data,

wherein said irradiation end extraction step comprises a step of carrying out processing

for the one-dimensional image data obtained in said accumulated image data production step.

15.   (Amended)   An image processing method for judging whether an object area in

an image includes an irradiation area, said method comprising:

a coordinate indication step of providing an indication of a plurality of rows for which

one-dimensional image data through said object area is to be extracted from said image;

a secondary difference value acquisition step of acquiring secondary difference values

from a plurality of primary difference values, wherein each primary difference value corresponds

to a difference between density values each of which represents a respective area in one

dimensional image data of said plurality of rows according to the indication in said coordinate

indication step;

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an irradiation end extraction step of extracting coordinates of end points of said

irradiation area from the secondary difference values acquired in said secondary difference value

acquisition step;

a storage step of successively storing the coordinates extracted in said irradiation end

extraction step;

an average acquisition step of acquiring an average of the plural coordinates stored in

said storage step;

a comparison step of comparing the average of the coordinates obtained in said average

acquisition step with a coordinate of an end point of the irradiation area included in said image,

said latter coordinate being obtained preliminarily; and

a first judgement step of judging whether said object area includes the irradiation area,

based on a result of the comparison in said comparison step.

16.   (Amended)   A method according to Claim 15, wherein said first judgement step

comprises a step of judging that said object area does not include the irradiation area, if the

average and the latter coordinate are close to each other, or otherwise judging that said object

area includes the irradiation area.

17.   (Amended)   A method according to Claim 15, further comprising a second

judgment step which is carried out based on a result of the judgment in said first judgment step,

wherein said second judgement step comprises a variance acquisition step of acquiring a

variance of the coordinate stored in said storage step, a variance comparison step of comparing

the variance obtained in said variance acquisition step with a predetermined value, and a

judgment step of judging whether said object area includes the irradiation area, based on a result

of the comparison in the variance comparison step.

18.   (Amended)   A method according to Claim 16, wherein said second judgment

step carries out its each step when said first judgment step results in judging that said object area

does not include the irradiation area.

19.   (Amended)   An image processing method for judging whether an object area in

an image includes an irradiation area, said method comprising:

a coordinate indication step of providing an indication of a plurality of rows for which

one-dimensional image data through said object area is to be extracted from said image;

a secondary difference value acquisition step of acquiring secondary difference values

from the one-dimensional image data according to the indication in said coordinate indication

step;

an irradiation end extraction step of extracting coordinates of end points of said

irradiation area from the secondary difference values acquired in said secondary difference value

acquisition step;

a storage step of successively storing the coordinates extracted in said irradiation end

extraction step;

an average acquisition step of acquiring an average of the plural coordinates stored in

said storage step;

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a comparison step of comparing the average of the coordinates obtained in said average

acquisition step with a coordinate of an end point of the irradiation area included in said image,

said latter coordinate being obtained preliminarily; and

a first judgement step of judging whether said object area includes the irradiation area,

based on a result of the comparison in said comparison step;

wherein said irradiation end extraction step comprises a step of carrying out said

extraction of coordinate, based on a sign, either positive or negative, of a primary difference

value of said one-dimensional image data.

21.   (Amended)   An image processing method comprising:

a characteristic quantity calculation step of calculating characteristic quantities of image

data;

an end point extraction step of extracting an end point of an object area in said image data

from the characteristic quantities calculated in said characteristic quantity calculation step;

an end point storage step of storing coordinates of end points extracted in said end point

extraction step;

a rotation angle indication step of indicating an angle of a rotation axis onto which the

end points stored in said end point storage step are projected;

an accumulated quantity calculation step of calculating projection of the end points stored

in said end point storage step onto said rotation axis of the angle indicated in said rotation angle

indication step and calculating an accumulated quantity of said projection of the end points in a

conditioned area on said rotation axis;

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an accumulated quantity storage step of storing said accumulated quantity calculated in

said accumulated quantity calculation step; and

a rotation angle judgment step of judging a rotation angle of the object area from said

accumulated quantities stored in said accumulated quantity storage step.

22.   (Amended)   A method according to Claim 21, wherein a start point of said

rotation axis onto which the end points stored in said end point storage step are projected is

placed at a barycenter of image data not less than a predetermined density value.

23.   (Amended)   An image processing apparatus comprising:

means for determining a plurality of areas arranged in a predetermined direction on an

image and each having a predetermined shape;

means for calculating a secondary difference value from a plurality of primary difference

values, wherein each primary difference value corresponds to a difference between density

values each of which represents a respective area in said plurality of areas; and

means for judging an end point of an irradiation area from said secondary difference

values calculated by said calculating means.

24.   (Amended)   An image processing apparatus comprising:

means for detecting an irradiation end, based on a density distribution in each area, for a

plurality of areas in a desired direction in said image; and

means for evaluating a result of said detection, based on said detected irradiation ends for

said plurality of areas;

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wherein said means for detecting comprises means for calculating a secondary difference value from a plurality of primary difference values, wherein each primary difference value corresponds to a difference between density values, each of which represents a respective area in each of said plurality of areas.

25.   (Amended)   An image processing apparatus comprising:

characteristic quantity calculation means for calculating said characteristic quantities of image data;

end point extraction means for extracting an end point of an object area in said image data from the characteristic quantities calculated by said characteristic quantity calculation means;

end point storage means for storing coordinates of end points extracted by said end point extraction means;

rotation angle indication means for indicating an angle of a rotation axis onto which the end points stored in said end point storage means are projected;

accumulated quantity calculation means for calculating projection of the end points stored in said end point storage means onto said rotation axis of the angle indicated by said rotation angle indication means and calculating an accumulated quantity of said projection of the end points in a conditioned area on said rotation axis;

accumulated quantity storage means for storing said accumulated quantity calculated by said accumulated quantity calculation means; and

rotation angle judgment means for judging a rotation angle of the object area from said accumulated quantities stored in said accumulated quantity storage means.

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26.   (Amended)   A computer-readable storage medium storing a program for

carrying out an image processing routine comprising:

a step of determining a plurality of areas arranged in a predetermined direction on an

image and each having a predetermined shape;

a step of calculating a secondary difference value from a plurality of primary difference

values, wherein each primary difference value corresponds to a difference between density

values each of which represents a respective area in said plurality of areas; and

a step of judging an end point of an irradiation area from said secondary difference values

calculated in said calculating step.

27.   (Amended)   A computer-readable storage medium storing a program for

carrying out an image processing routine comprising:

a step of detecting an irradiation end, based on a density distribution in each area, for a

plurality of areas in a desired direction in said image; and

a step of evaluating a result of said detection, based on said detected irradiation ends for

said plurality of areas;

wherein said detecting step comprises calculating a secondary difference value from a

plurality of primary difference values, wherein each primary difference value corresponds to a

difference between density values each of which represents a respective area in each of said

plurality of areas.

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28.　　(Amended)　　A computer-readable storage medium storing a program for carrying out an image processing routine comprising:

a characteristic quantity calculation step of calculating characteristic quantities of image data;

an end point extraction step of extracting an end point of an object area in said image data from the characteristic quantities calculated in said characteristic quantity calculation step;

an end point storage step of storing coordinates of end points extracted in said end point extraction step;

a rotation angle indication step of indicating an angle of a rotation axis onto which the end points stored in said end point storage step are projected;

an accumulated quantity calculation step of calculating projection of the end points stored in said end point storage step onto said rotation axis of the angle indicated in said rotation angle indication step and calculating an accumulated quantity of said projection of the end points in a conditioned area on said rotation axis;

an accumulated quantity storage step of storing said accumulated quantity calculated in said accumulated quantity calculation step; and

a rotation angle judgment step of judging a rotation angle of the object area from said accumulated quantities stored in said accumulated quantity storage step.

29.　　(New)　　An apparatus for a radiographic image, comprising:

a determination unit adapted to determine a plurality of discrete positions arranged in a direction on a radiographic image;

a calculation unit adapted to calculate a characteristic on the basis of values of said

radiographic image at each successive three of said discrete positions; and

a judgment unit adapted to determine an end point of an irradiation area in said

radiographic image on the basis of said characteristics calculated by said calculation unit.

30.   (New)   A method of processing a radiographic image, comprising:

a determination step of determining a plurality of discrete positions arranged in a

direction on a radiographic image;

a calculation step of calculating a characteristic on the basis of values of said

radiographic image at each successive three of said discrete positions; and

a judgment step of determining an end point of an irradiation area in said radiographic

image on the basis of said characteristics calculated in said calculation step.

31.   (New)   A computer-readable storage medium storing a program for

carrying out a method of processing a radiographic image, said method comprising:

a determination step of determining a plurality of discrete positions arranged in a

direction on a radiographic image;

a calculation step of calculating a characteristic on the basis of values of said

radiographic image at each successive three of said discrete positions; and

a judgment step of determining an end point of an irradiation area in said radiographic

image on the basis of said characteristics calculated in said calculation step.

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